

MATERIAL CONDITION ASSESSMENT WITH SPATIALLY PERIODIC FIELD SENSORS

ABSTRACT OF THE DISCLOSURE

Inductive sensors measure the near surface properties of conducting magnetic
5 materials. The sensors generally include parallel winding segments to induce a spatially
periodic magnetic field in a material under test. The sensors may provide a directionally
dependent measure with measurements made in varying orientations of the sensor with
respect to the material property variation directions. The sensors may be thin,
conformable sensors that can be mounted on a test material and, for example, monitor
10 crack initiation under the sensor. A second sensor may be left in air to provide a
reference measurement, or the temperature of the material under test can be varied to
verify the response of the individual sensing elements. Sensors can be mounted to
materials under test in order to not modify the environment that is causing the stress
being monitored. A sensor may be flexible to conform to the shape of the surface of the
15 material under test and may be mounted in difficult to access locations such as around
fasteners of an aircraft. Spatially periodic field eddy current sensors may be scanned
across a material to create images of the absolute material property beneath the sensor.